STEP 1

DEPOSIT COPPER INTO PATTERN OF TRENCHES AND VIA OPENINGS PREVIOUSLY FORMED IN SURFACE OF DIELECTRIC LAYER

STEP 2

PLANARIZE UPPER SURFACE OF RESULTING STRUCTURE TO REMOVE ALL COPPER ON UPPER SURFACE OF DIELECTRIC LAYER, LEAVING COPPER REMAINING ONLY IN TRENCHES AND VIAS

STEP 3

ANNEAL COPPER REMAINING IN TRENCHES AND VIAS

FIGURE 1 (PRIOR ART)

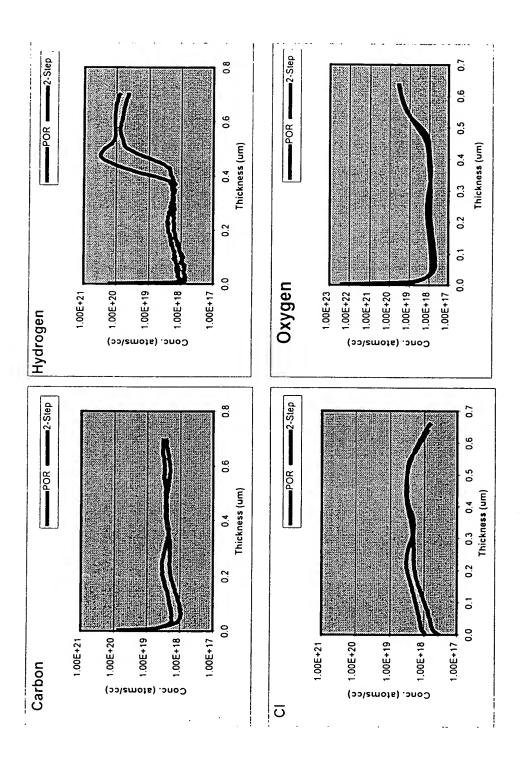


FIGURE 2

STEP 1

DEPOSIT SUFFICIENT COPPER INTO PATTERN OF TRENCHES AND VIA OPENINGS FORMED IN DIELECTRIC LAYER TO AT LEAST PARTIALLY FILL SAID TRENCHES AND VIA OPENINGS

STEP 2

ANNEAL DEPOSITED COPPER, INCLUDING COPPER DEPOSITED IN TRENCHES AND VIA OPENINGS

STEP 3

SURFACE CLEANING OR THIN SURFACE LAYER REMOVAL OF THE DEPOSITED COPPER

STEP 4

REPEAT STEPS 1 & 2 AT LEAST ONE MORE TIME

STEP 5

THEN PLANARIZE UPPER SURFACE OF RESULTING STRUCTURE TO REMOVE ALL COPPER ON UPPER SURFACE OF DIELECTRIC LAYER, LEAVING COPPER REMAINING ONLY IN TRENCHES AND VIAS

STEP 6

ANNEAL COPPER IN TRENCHES AND VIAS

	ECP Process	MTF	Sigma	$\mathrm{T}_{0.1\%}$, at use cond.
Met 2 EM	1-step	119	8.0	240
	2-step	70	0.4	492
Via 1 EM	1-step	52	0.51	51
	2-step	43	0.22	103

FIGURE 4

FIRST SEQUENCE, STEP 1

DEPOSIT SUFFICIENT COPPER INTO PATTERN OF TRENCHES AND VIA OPENINGS FORMED IN DIELECTRIC LAYER TO AT LEAST PARTIALLY FILL SAID TRENCHES AND VIA OPENINGS

FIRST SEQUENCE, STEP 2

ANNEAL DEPOSITED COPPER, INCLUDING COPPER DEPOSITED IN TRENCHES AND VIA OPENINGS

STEP 3

SURFACE CLEANING OR THIN SURFACE LAYER REMOVAL OF THE DEPOSITED COPPER

SECOND SEQUENCE

REPEAT STEPS 1, 2, & 3 OF FIRST SEQUENCE TO COMPLETE FILLING OF TRENCHES AND VIAS

THEN PLANARIZE UPPER SURFACE OF STRUCTURE TO REMOVE AT LEAST SOME OF THE COPPER ON THE UPPER SURFACE OF THE DIELECTRIC LAYER

THIRD SEQUENCE

DEPOSIT FURTHER COPPER UNDER BULK PLATING CONDITIONS, PLANARIZE TO REMOVE ALL COPPER ON TOP SURFACE, FINAL COPPER ANNEAL